

# Low Cost Nano and Micro Satellite Launch Stage and Automated Hypersonic Test Platform, Phase I

Completed Technology Project (2018 - 2019)



## Project Introduction

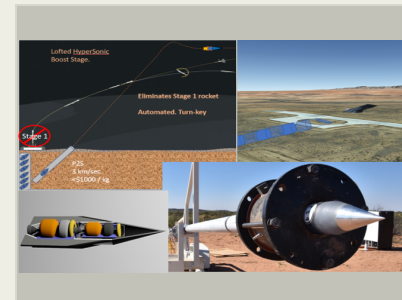
HyperSciences, Inc. is proposing a robust, cost effective, automated hypersonic launch system and encapsulated projectile bus capable of delivering small payloads to altitudes as high as 100Km. HyperSciences uses our proven, existing and patented Ram accelerator-based launch architecture and in-ground launch site based at Spaceport America to launch payloads at greater than Mach 5. This cost-effective launch vehicle enables cheap access to high altitude and space, providing on-demand launches. One novel feature of the Ram accelerator is a fully tailorable G-load profile with length and simple gas propellant selection. Because of the loads experienced during launch minor G-load toughening of existing payloads are only required, as a result a new class of tough, low-cost payloads will emerge to be able to be flown on this system. The reduction of cost and the ability to have on demand launch services will further strengthen and accelerate the developing small satellite and hypersonic test vehicle market. Some of the key innovations in this technology which allow the impulsive launch are:

- Automated hypersonic testing platform for stage 1 launch replacement and hypersonic testing
- Heat resistant aero shell to help protect payload and upper stages
- Extendable features to allow for stable flight throughout launch
- "Egg carton" technology to help share acceleration load throughout the structure

## Anticipated Benefits

Payloads could be flight tested on board the launch vehicle prior to being integrated into larger launch system. Exposure of the payload to the moderate g-loads of the impulsive launch would provide for an effective test of payload robustness. The mass driver can be readied for launch in a matter of minutes which would provide game-changing responsiveness in satellite launch. The lifetime of satellites could be reduced because the cost & time to launch a replacement satellite would be very low

By reducing the cost of building and launching satellites, satellite-based internet and communication everywhere on the planet would become more feasible. Many Nano or Micro satellites in orbit would also have many benefits in the arena of video monitoring, defense, agriculture, etc. The barrier to space access will be lowered both from an economic and a technological standpoint.



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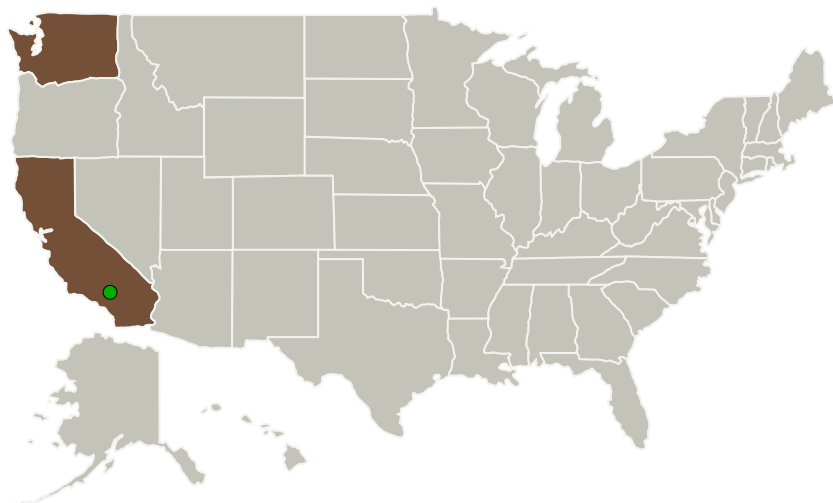
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
HyperSciences, Inc	Lead Organization	Industry	Spokane, Washington
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

### Primary U.S. Work Locations

California	Washington
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## Project Transitions

**July 2018:** Project Start**February 2019:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137851>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

HyperSciences, Inc

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

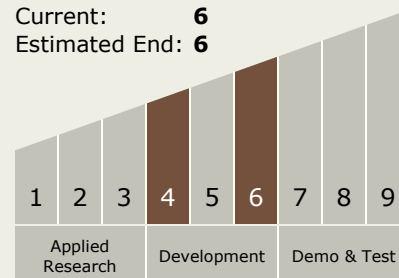
Carlos Torrez

### Principal Investigator:

Mark C Russell

## Technology Maturity (TRL)

Start: 4  
Current: 6  
Estimated End: 6



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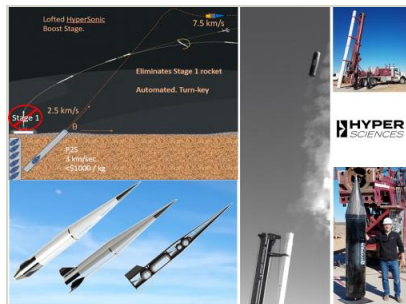


## Images



### Briefing Chart Image

Low Cost Nano and Micro Satellite Launch Stage and Automated Hypersonic Test Platform, Phase I (<https://techport.nasa.gov/image/128800>)



### Final Summary Chart Image

Low Cost Nano and Micro Satellite Launch Stage and Automated Hypersonic Test Platform, Phase I (<https://techport.nasa.gov/image/132481>)

## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.4 Advanced Propulsion
  - └ TX01.4.4 Other Advanced Propulsion Approaches

## Target Destination

Earth